

Serial No. 10/060,737

PATENT
Docket No. 58027-011100REMARKS

Reconsideration of this application is requested.

Claims 1-19 were rejected under 35 USC 112, second paragraph as being indefinite for failing to point out and distinctly claim the subject matter. These claims are now amended to overcome this rejection.

Independent claim 1 was rejected under 35 USC 102(b) as being anticipated by Wegeng (US. No. 5,811,062).

The '062 patent teaches a micro-component chemical process sheet architecture. The Examiner, in her rejection of independent claim 1, contends that the '062 patent (col. 11, lines 9-31, FIG. 9) shows an evaporator 912 adjacent that chamber 902 for evaporating liquid into the combustion chamber 902. Respectfully, the Applicants' disagree with the Examiner (emphasis added).

Nowhere does the '062 patent teach, disclose, or suggest the evaporating liquid being supplied to the combustion chamber. In fact, the evaporated liquid always flows in a separate channel 912 and is never evaporated into the combustion chamber 902 (col. 11, lines 9-22, and FIG. 9). This is unlike the present invention, according to claim 1, where the evaporated fluid is directly supplied to the combustion chamber for mixing with the oxidizer and subsequent combustion. This combustion of the evaporated fluid generates an acoustic wave, which causes fresh oxidizer to be drawn from the inlet into the chamber (paragraph 43 of the specification).

Independent claim 1 was rejected under 35 USC 103(a) as being unpatentable over Masel *et al.* (US. No. 6,193,501).

The '501 patent teaches a micro-combustor having sub-millimeter critical dimensions. The Examiner, in her rejection of independent claim 1, extrapolates that the preheat section 24 (col. 5, lines 56-67, FIG. 2), for pre-heating a fuel, could be an evaporator. Respectfully, the Applicants' disagree with the Examiner.

Serial No. 10/060,737

PATENT
Docket No. 58027-011100

Nowhere does the '501 patent teach, disclose, or suggest the use of **non-pressurized fluids** by the evaporator for combustion process. In fact, the system, as disclosed in the '501 patent, requires the use of pressurized reactants (col. 5, lines 48-50). This is unlike the present invention where the fluids are in a non-pressurized state (paragraph 43 and 45 of the specification). This is advantageous for reasons explained as follows:

All combustion engines require methods of introducing oxidizer and fuel into the combustion chamber. The combustion occurs at gaseous states even if the fuel/oxidizer supplied is liquid or solid. Furthermore, miniature engines are heavily restricted to a gas-phase fuel/oxidizer in the combustion chamber, since liquid or solid particles can easily clog up any small chambers inherent of miniature combustion engines. Thus, if gas-phase fuel or oxidizer is used, appropriate methods of sealing (valves) and supply (pumps) must be included, since a gas will not be displaced without diffusion (which is too slow for applications envisioned by the present invention) or by pressurization. Additionally, a gas will leak unless it is sealed. By default, any system that uses gas will, at a minimum, require a valve and a pump (or pressurized tanks). Clearly, the employed valve and/or pump will dramatically increase the engine size. Obviously, this is inconsistent with the goal of miniaturization. In contrast, if a liquid is used, then a method of transforming the liquid to a gas is required. Standard engines use atomization, but this requires pump and valves due to the nature of pressurization. Some engines feed back the exhaust pressures, to provide pump action, but engine throttling is still provided by a fuel valve. In addition, a method of mixing the reactants is also required since fluids do not mix well in small spaces (smaller than $\sim 1\text{mm}^3$). However, unlike gas, liquids can be transported with specially designed fluidic paths automatically due to "sticking" properties of specific liquids with respect to specific wall materials (such as a water column climbing up a small glass tube). Thus, the present invention takes advantage of this and the pulsating combustion nature of the engine to aspirate the chamber (naturally drawing in the oxidizer, such as ambient air, through an aerodynamically designed inlet), since the pulsating nature of the combustion provides an excellent natural mixing means. Furthermore, in the present invention, since the oxidizer (ambient air) is in a gaseous state, and the fluid arriving through the inlet paths is converted to a gas phase, right at the combustion chamber, no valves (for sealing any toxic/reactive gases) are

Serial No. 10/060,737

PATENT
Docket No. 58027-011100

required. Thus, the present invention drives towards one goal, the ability to miniaturize the entire engine into a miniature device without the need for any moving parts.

Accordingly, claim 1 has been amended to include the feature of the fluids being in a non-pressurized state. No new matter has been added.

New claims 21-23 further distinguish the invention from the prior art.

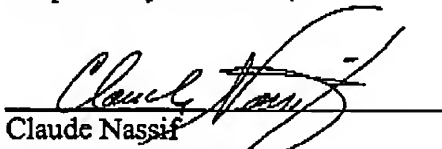
Accordingly, it is requested that the rejection of amended independent claim 1 and dependent claims 2-19 be withdrawn. It is submitted that claims 1-22 are now allowable.

Any additional fees required in connection with this communication which are not specifically provided for herewith are authorized to be charged to the Deposit Account No. 50-2638 in the name of Greenberg Traurig, LLP. Any overpayments are also authorized to be credited to this account. Any extensions of time that are necessary for this paper, or any extensions of time that will be required for papers to be submitted in this case in the future, are hereby generally requested.

In view of the above, it is submitted that this application is now in good order for allowance, and such early action is respectfully solicited. Should matters remain which the Examiner believes could be resolved in a telephone interview, the Examiner is requested to telephone the Applicants' undersigned attorney.

Respectfully submitted,

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